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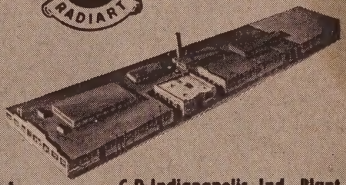
Cleveland, Ohio, Plants

C-D Fuquay Springs Division, N. C.



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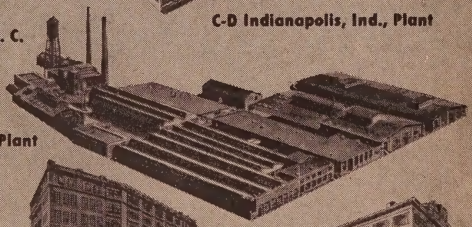

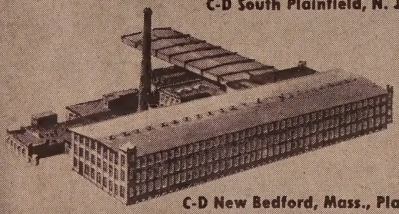

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Vol. 17 FEBRUARY, 1952 No. 2

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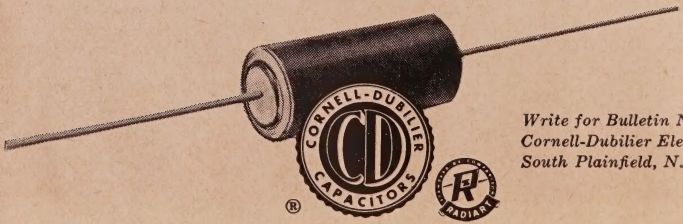

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SUPERSENSITIVE SIGNAL TRACER FOR RADIO AND T. V.

The untuned signal tracer, introduced at the end of the War, remains one of the simplest yet most effective instruments for rapid trouble shooting in receivers. This instrument is simple and straightforward and very nearly foolproof in its operation. Able to spot trouble at the source, it requires no complicated manipulations. There is scarcely a practicing service technician who is not familiar with the signal tracer. The availability of miniature tubes and high-efficiency crystal diodes, together with the experience gained during the past six years, in the use of signal tracers, has made possible several useful improvements in the instrument. It was with these improvements in mind that the signal tracer described in this article was developed.

One improvement concerns overall gain. A signal tracer must be capable of picking a weak test signal from a receiver at low-gain points in the circuit, such as near the antenna input terminals. This means that the tracer itself must have high gain. In building modern signal tracers, there accordingly is every reason to employ the maximum gain consistent with stability. Incorporation of a continuously variable gain control then permits rapid adjustment of overall gain to any satisfactory level between zero and maximum.

The other improvement relates to crystal diodes. A diode is used as the r. f. demodulator in the r. f. signal pickup probe. High demodulation efficiency is afforded by modern high-back-resistance germanium diodes such as Type 1N54. At the same time, the high back resistance of this diode minimizes circuit loading, as viewed over the entire signal cycle, by reducing reverse current flow.

An incidental improvement is the use of miniature tubes which provide a maximum of compactness in the completed instrument. Thus, it is possible to construct a signal tracer with increased gain over earlier models and to incorporate both aural and visual monitoring (loudspeaker and meter) and still keep the complete instrument within the overall size of a midget radio. Two signal inputs should be provided in a modern signal tracer; one high gain for weak signals—the other low gain for relatively large audio voltages.

While most service technicians are inclined to associate the untuned signal tracer only with amplitude-modulated broadcast receivers, it is important to note that this instrument is useful also in troubleshooting in television, f. m., and shortwave receivers, audio amplifiers, phonograph pickups, microphones, radio-frequency and audio-frequency oscillators and signal generators, and for locating the seat of hum, distortion, and noise in other instruments. There undoubtedly are numerous other applications, as well, which will suggest themselves to the reader.

Description of the Instrument

A functional block diagram of the modern, sensitive signal tracer is shown in Figure 1. The instrument essentially is a high-gain audio amplifier, terminated with a loudspeaker for aural signal tracing and an audio-frequency v. t. voltmeter for visual signal tracing. A crystal-type demodulator probe is provided for picking up signals in the r. f., i. f., and oscillator stages of a receiver under test, and a straight input probe for tracing in the audio, video, and low-frequency stages.

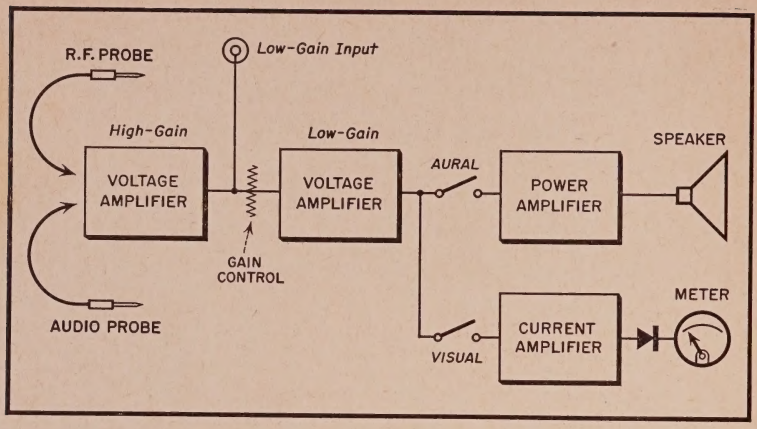

Fig. 1. Block diagram of signal tracer.

The input voltage amplifier is a high-gain stage with a gain of approximately 200, and the intermediate voltage amplifier a low-gain stage with a voltage gain of approximately 10. The gain control is between these two stages. In addition to the main input (intended primarily for low-level input signals) at the front end of the high-gain amplifier, there is also a second input, for **high-level audio** signals only, between the two voltage amplifiers. The amplified signal is presented to a power amplifier stage (output of approximately 4 watts) which drives a small loudspeaker, or to a current amplifier which drives an indicating milliammeter through a crystal rectifier. The two switches following the low-gain amplifier stage permit either aural or visual monitoring or both, as may be desired.

Sensitivity of the instrument is such that a signal of about 4 millivolts r. m. s. at the input of the high-gain voltage amplifier is sufficient to drive the power amplifier to full loudspeaker output, and will deflect the indicating meter to full scale.

The power supply is completely self-contained, and is transformer-operated for maximum safety to the operator and minimum interaction between the power line, equipment under test, and signal tracer.

The complete circuit diagram is given in Figure 2. The amplifier section is comprised of the 6AU6 high-gain pentode circuit, 6C4 low-gain triode stage, 6AQ5 power amplifier and 6AQ6 current amplifier and metering stage. Input jack J_1 allows the full gain of the instrument to be utilized if either the r. f. or audio probe is plugged-in. The secondary input jack, J_2, allows only the low-gain portion of the amplifier to be used, and is employed in conjunction with the audio probe for checking high signal voltages such as might be delivered by amplifier stages, phonograph pickups, etc. The r. f. probe consists of the IN54 germanium diode, capacitors C_1 and C_2, and resistor R_1. The audio probe is a simple shielded, meter test prod. Both probes are provided with shielded handles (to minimize body capacitance), flexible shielded cables, ground clips, and plugs for insertion into the input jacks of the tracer.

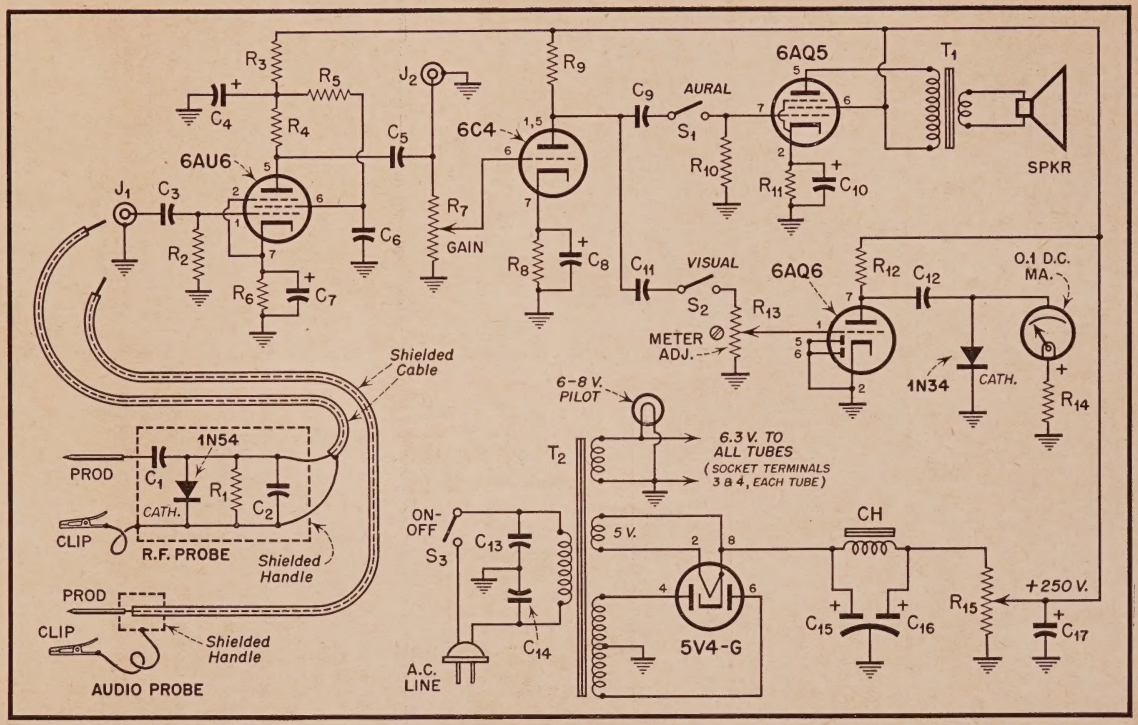

Fig. 2. Complete circuit diagram of signal tracer.

For maximum stability, a decoupling filter, comprised of resistor R_3 and capacitor C_4, is incorporated in the high-gain pentode stage. The gain control, R_7, allows smooth control of both loudspeaker output and meter swing, with a minimum of noise.

When only switch S_1 is closed, the loudspeaker will be in operation as the signal monitor. This is a useful arrangement when a listening test is judged sufficient. When only switch S_2 is closed, the meter will serve as the signal monitor and signal tracing will be entirely visual and silent. When both switches are closed, both speaker and meter will be in operation and the technician will have a double check on the signal. By using both indicators, the quality of a signal, as well as its quantity (strength), can be determined. For example, the signal intensity may be judged from the meter reading, and the presence of hum or distortion noted from the speaker signal.

The 6AQ6 stage supplies an audio signal voltage which is rectified by the IN34 germanium diode to drive the 0-1 d. c. milliammeter. Potentiometer R_{13} in this stage is used to set the operating level of the current amplifier. This adjustment is made during the initial calibration of the instrument and need not be altered subsequently unless the tube is replaced. For that reason, R_{13} is mounted on the chassis inside the instrument and is provided with a slotted shaft for screwdriver adjustment.

The power supply is choke-filtered for best hum suppression. Additional filtering is provided by the buffer capacitor, C_{17}, at the d. c. output voltage tap on voltage divider R_{15}. Line bypass capacitors C_{13} and C_{14} aid materially in reducing pickup of extraneous interference from the power line and in suppressing hum which otherwise might be coupled into the equipment under test. Total power supply requirements are approximately 75 milliamperes at 250 volts d. c., and 1.05 ampere at 6.3 volts a. c.

Construction Hints

The circuit diagram shows the signal tracer to be a relatively simple device. Its construction is not critical. However, the builder must remember that this essentially is a high-gain amplifier subject to all of the usual ills of high-gain equipment. All of the rules of good practice referring to construction of high-gain amplifiers apply in this instance. An especially important pointer is that all grounds in a particular stage must be returned to one chassis lug in that stage.

Keep all leads as short and direct as possible. Do not depend upon the chassis as a current path, but instead connect all individual stage grounds together with a length of No. 12 or 14 bare wire and return this bus directly to B-minus of the power supply.

Twist the filament leads into a tight pair and keep this pair close against the chassis. Ground one side of the filament circuit, to reduce hum.

Mount the power transformer and filter choke farthest from the 6AU6 stage, and orient the choke, if necessary, to reduce 120-cycle hum.

The 6AU6 and 6C4 tubes must be shielded individually. The 6AU6 also must be mounted in a cushioned socket to prevent microphonics.

The input jacks, J_1 and J_2, are specified in Figure 2 as microphone connectors. Matching microphone plugs are attached to the cables of the two probes. However, a closed-circuit phone jack can be used for J_1 and an open-circuit phone jack for J_2, and shielded phone plugs may be attached to the probe cables. The r. f. and audio probe handles must be shielded. Either a small, insulated can or cylinder may be used as the handle, or the inside of a plastic tube may be lined with metal foil. If the operator already has on hand a crystal probe for his d. c. vacuum-tube voltmeter, it may be used as the r. f. probe for the signal tracer.

After the instrument has been completed and its wiring thoroughly checked, the tubes should be inserted and the d. c. voltage adjusted in the

following manner: (1) Set controls R_7 and R_{13} to their grounded ends. (2) Close both S_1 and S_2. (3) Set clip on R_{15} about ¼ up from grounded end. (4) Plug instrument into power line and allow about 2 minutes for tube heaters to reach stable temperature. (5) Connect high-resistance d. c. voltmeter (20,000 ohms per volt, or a d. c. vacuum - tube voltmeter) between ground and clip on R_{15}. (6) Adjust slider on R_{15} for voltmeter reading of exactly 250 volts, and tighten slider in position. **Power supply adjustment now is completed.**

Adjust the meter circuit in the following manner: (1) Plug-in signal tracer, a. c. vacuum-tube voltmeter-millivoltmeter, and audio oscillator, and allow 10-minute warmup period. (2) Connect audio probe to audio oscillator (tuned to 1000 cycles) and v. t. voltmeter and plug probe into jack J_1 of signal tracer. (3) Open switch S_1 and close switch S_2. (4) Set gain control R_7 to maximum. (5) Set audio oscillator for 4 to 5 millivolts output, as indicated by v. t. voltmeter. (6) Adjust control R_{13} for full-scale deflection of the 0-1 milliammeter. (7) Close switch S_1 to check operation of loudspeaker. **Adjustment of signal tracer now is completed.**

To check the r. f. input: (1) Connect r. f. probe to output of amplitude-modulated r. f. signal generator set to 1000 kc. Plug probe into jack J_1 of signal tracer. (2) Switch-on signal generator and signal tracer and allow 2-minute warmup period. (3) Set signal generator for 5 millivolts (5000 microvolts) output. (4) Close switches S_1 and S_2. (5) Advance gain control R_7, while noting speaker output and deflection of milliammeter in signal tracer.

The signal tracer often is used to check gains at various points in a circuit under test, to determine the extent of amplification or loss of signal strength. In this connection, gain control R_7 may be provided with a special dial graduated in arbitrary units to indicate gain levels. This calibration of the dial may be made by feeding into jack J_1, audio signals (1000 cycles) at various millivolt levels, as indicated by an a. c. vacuum-tube millivoltmeter. The input signal voltage for full-scale deflection of the milliammeter at various settings of control R_7 are determined, and the R_7 dial graduated accordingly.

PARTS LIST

C_1—0.01 ufd. mica (TM-5S1 or 1D-3S1)
C_2—0.00005 ufd. mica (TM-5Q5 or 5W-5Q5)
C_3, C_6, C_{11}, C_{13}, C_{14}—0.1 ufd. 400 v. tubular (PTE-4P1)
C_4, C_{17}—8 ufd. 450 d. c. w. v. electrolytic (BR-845)
C_5, C_9—0.05 ufd. 400 v. tubular (PTE-4S5)
C_7, C_8—10 ufd. 25 d. c. w. v. electrolytic (BR-102A or BBR-10-25)
C_{10}—25 ufd. 25 d. c. w. v. electrolytic (BR-252A)
C_{12}—2 ufd. 400 v. (DYR-6200)
C_{15}, C_{16}—Dual 8 ufd. 450 d. c. w. w. electrolytic (BRD-8D45 or EDL-8D45)
CH—10.5 henries, 110 ma. filter choke —Stancor C-1001
J_1, J_2—Panel jack—Amphenol 75-PC1-M, with matching 75-MC1F cable plugs
R_1—1 megohm ½ watt carbon
R_2, R_5, R_{10}—0.47 megohm ½ watt carbon
R_3, R_9—47,000 ohms ½ watt carbon
R_4—0.22 megohm ½ watt carbon
R_6, R_{14}—1000 ohms ½ watt carbon
R_7—0.5 megohm potentiometer
R_8—3900 ohms ½ watt carbon
R_{11}—250 ohms 2 watt carbon
R_{12}—100,000 ohms 1 watt carbon
R_{13}—5.0 megohm potentiometer
R_{15}—20,000 ohms 25 watt wirewound, with slider
S_1, S_2, S_3—S. p. s. t. toggle switches
SPKR—Small permanent-magnet dynamic loudspeaker
T_1—Output Transformer: 5000-ohm plate to speaker voice coil
T_2—Power Transformer: 350-0-350 v., 120 ma.; 5 v., 3 A.; 6.3 v., 4.7 A. —Stancor P-6013

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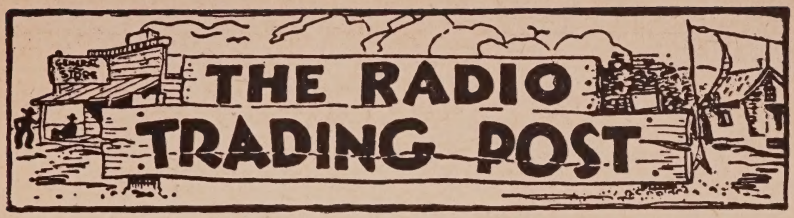

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SELL OR SWAP—1500 V, 200 MA power supply, 1,000 W power amplifier, 100 W C.W. Stancor transmitter, tubes 6L6's, 801's, 805's; Radio Magazines. Want 17" TV set, good make. Bill Kamish, 901 Bauman, Austin, Minn.

FOR SALE—Combination watch, clock and radio repair shop. Will sell everything except a few personal items. Located on highway of America, doing good business. Write V. D. Kinard, Box 654, Big Spring, Tex.

FOR SALE—Heathkit SG-6 R.F. signal generator, $19; Shure 508A crystal "mike" with 20' cable, $10; RCA 10BP4 with yoke, P.M. focus coil, output transformer $12. Swap for 12" Rekocut 2 or 3 speed turntable, cash, or what have you? Robert Flory, 715 E. Buffalo St., Ithaca, N. Y.

TRADE—A complete De Forrest's Radio & Television Course, cost $300—trade for good tape recorder or enlarger and printing equipment for developing and enlarging. George Edelman, 985 Simpson St., Bronx 59, N. Y.

WANTED—Riders 9, 10, 12, 13, 14; 7x50 binoculars and Weaver K-6X or K-8X riflescope. Have 100MA, 30-0-30MA other basic meters, parts and tubes; Weaver J-4 rifle-scope and top mounts 6x30 binoculars. Dean Ford, 514 Park Ave., Kokomo, Ind.

FOR SALE—Complete wire recorder mechanism including 3 tube converter, ready to plug into amplifier or radio, A1 cond. $40. J. A. Baron, 22 Hancock St., Lynn, Mass.

FOR SALE—SCR-522, excellent; several sets new coils complete for each band for national NC-100-A1 and NC-100-ASN receivers; extended range, 20-watt, 12-inch speaker, new; Marion 3-inch square, hermetically sealed, 0-100 MADC meter, ike new; make offer. Phil Collins, 6 Histella St., Santurce, Puerto Rico.

SELL OR TRADE—Complete N.R.I. Radio and Television communications course, $70 or a good NC-57 or S-40 receiver or best offer. Take $4 for surplus 5.3MC-7MC transmitter T21/ARC5. Walter Szymanski, 20019 Goulburn, Detroit 5, Mich.

FOR SALE—Multitester model 447-A R.C.P. $10; Triplett tube tester model 3413; D.C. motored reducing vibrator; all like new. Chas. Horn, 325 E. 163 St., New York 56, N. Y.

WANTED—Rider Manuals vol. 15 and up, single or several. State price. Elton Hoornstra, 305 Ann St., Sault Ste. Marie, Mich.

SWAP—Superior TV-30 sig. gen.; Superior No. 670 V.O.M. Pilot TV-37 rec. Misc. radio and TV parts. Want 35MM or larger camera. H. Rose, 5032 Brooklyn Ave., Los Angeles 22, Calif.

FOR SALE—Rider Manuals vol. 6, 8, 9, 10, and 11 in good condition, one owner $25 for lot. P. J. Green, 1932 Stilwell Blvd., Port Arthur, Tex.

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FOR SALE—Complete 300 W XMTR Millen RF final PP812 modulator, exciter, speech amplifier, and power supplies. Will sell direct, no shipping. Rocco Champi, 6 W. Washington Ave., Atlantic Highlands, N. J.

WANTED—Public address system, must be 50 W or more, must have mike, phono and speakers. Will trade radio tubes and stock for same. Give wattage and value in first letter. Day's Radio Shop, R.D. 1, Wiscasset, Me.

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TRADE—Heathkit Cond. Checker, Modern Radio Servicing, Radio Trouble Shooters Handbook, Hallicrafters S-38 rec. Want Triplett 1175B portable multitester and sig. gen. and late model tube tester. John Simmons, Box 513, Alamosa, Colo.

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TRADE—Tubes, controls, switches, condensers, resisters, transformers and misc. parts for short wave set AC power supply or record changer. Clarence W. Hull, Rt. 1, Box 363, Folsom, Calif.

WANTED—German tubes. Also schematic or set bulletins for the following sets: RCA Models 224, T60, R-4; West. Model WR312; Fada Model 740; Sentinel Model 248; Beverly No. 100; Crosley Model T40; GE model 54; Philco 270 no. 27A, 370 and 370A. Golden Rule Service, PO Box 784, Springfield, Mass.

SWAP OR SELL—Camera equipment, Speed Graphic 2 1/4x3 1/2, all accessories. Omega enlarger, all accessories, will swap for TV test equipment. E. E. Shephard, Mt. Vernon Rd., RD 2, Somerville, N. J.

FOR SALE—7EP4, good cond. $7.50; Masco MA121 HiFi amplifier, like new; Audio development 71F amplifier, like new; 12" coax. speaker John V. Urban, 140-34 Holly Ave., Flushing, N. Y.

TRADE — N.R.I. Comm. Course xmitter. Complete, tubes, power supply, audio modulator, mike, crystal; used few hours. Want good audio amplifier, test equipment or? Prefer local trade. Frank K. Smith, Spring Mount, Pa.

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FOR SALE—UTC type A-30 Audio tone control choke, like new $3. Burlington 2" sq. 0-15 MA meter, like new $3. Rider's Man. on Auto. Record Changers $3.50; GI recording type phono turntable $6. W. C. Trautman, Rt. 3, Box 53, Racine, Wis.

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FOR SALE—Heathkit 0-6 scope, phase control added, ex. cond., $40; Webster-Chicago wire recorder model 180 with improvements, 3 take-up drums, 19 1 hr., 2 1/2hr., 2 1/4 hr. spools, $115. Howard's Radio, Glencoe, Calif.

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FOR SALE—Chicago P50-150 output trans. astatic FLC pick-up arm with 2 "U" type crystal cartridges with diamond points—33 1/3, 45, 78 RPM. J. Holloway, 18 Lee Ave., Haddonfield, N. J.

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FOR SALE — Ghirardi's Radio Physics Course, 2nd Ed., 972 pp.; Video Hand Book, 892 pp., Sheraga and Roche; Radio Data Book, 1148 pp., Boyce and Roche. In perf. cond., $15 postpaid. Ben Marconi, 120 Gatling Pl., Brooklyn 9, N. Y.

WANTED—TV test equipment, sweep and marker generators, oscilloscope, tube tester, condenser, tester and V.T.V. meter. E. D. Jacobs, Carrollton, Ga.

FOR SALE—Electric heating pad; 12' copper vertical antenna—3 sections; 2 6K8 metal tubes, like new; 3 high grade variable condensers. All for $4.50 cash postpaid. Herman Fischer, 107 St. Marks Ave., Brooklyn 17, N. Y.

WANTED—Copy of "Microwave Transmission Design Data", Pub. No. 23-80, Sperry Gyroscope Co. State cond. and price. Have texts to swap. George M. Underberger, 6213 Alonzo Ave., Reseda, Calif.

FOR SALE—Philco CR 503 custom built car radio in original carton, with face plate for 1951 Ford. List price $64.50; first $45 takes it. Fred Hartmann, 63-04 B'way Woodside, L. I., N. Y.

FOR SALE—Heathkit, VTVM, V-4A; oscilloscope 0-6; completely wired with test leads and schematics. Precision sig. gen. E-200C, all in perf. cond. A. H. Steinberg, 14-27 Chandler Dr., Fair Lawn, N. J.

SELL OR TRADE—SLR-H, 110 VAC 60 cycle, 0.53-1600 Kc. Supreme model 85 tube checker, like new; Turner dyn. mike, 30 cycle; Wright-Decoaster 8" speakers w/ univ. xformers. Want 6 VDC power supply or what have you? Roberts Speaker Repair, 2637 Liberty Rd., Muskegon, Mich.

FOR SALE—Heathkit tube tester model TC-1, completely wired, 2 mos. old, $30 with instruction book; Heathkit sig. tracer model T-2, wired, good order, instruction book, $20. George M. Javor, 2039 E. 31st. St., Lorain, Ohio.

FOR SALE—Charvos-Roos slide rule No. SR-105M with case; 9 scales, like new, $3. Wm. Lubs, 182 Jackson Ave., N. Tonawanda, N. Y.

FOR SALE—Hickok model 156 Indicating traceometer 2 yrs. old, never used, all books, cables, etc. Cost $295 new, will sell for $100. Cash or swap for 5 ton Min. hydraulic arbor press or 5 ton Min. hand operated or power punch press. Coffey's, 29 Alden St., Cranford, N. J.

FOR SALE — 1951 Ford auto radio and speaker never used. Best reasonable offer or as part payment for Hickok model 156 traceometer. K. Laursen, 2214 Beverly Blvd., Berkley, Mich.

WANTED — Hickok 209A Electronic voltmeter, 534 tube tester, 288x or Precision E200 C sig. gen., cond. tester. Will sell or trade Heathkit tube tester and sig. gen., Superior VOM meters models 670 and 770. D. T. Willis, 1404 S. Jackson St., Tucumcari, N. M.

FOR SALE—Philco AR9—short wave and regular broadcast bands; recently revamped, exc. cond. Will sell for $25. W. H. Collins, 643 E. 83rd Pl., Chicago 19, Ill.

FOR SALE—Hickok VTVM, model 203 sig. gen., model 288X; Precision tube tester, model 954-G, all in perf working cond. Will sell individually or all for $243. N. C. King, PO Box 561, Bonifay, Fla.

FOR SALE—Collector's item. Westinghouse 1922 radio; type RC S-325966 with Vocarola speaker S-319530; list price $246; will trade on tubes, test equipment, picture tube, etc. E. E. Youngkin, 602 E. Grant Ave., Altoona, Pa.

FOR SALE—Hammarlund Super Pro SP200X with power supply and matching speaker, each in table cabinet. $140 if within 100 miles, $10 extra otherwise. Write P. D. Boothroyd, Box 142-G, Sparta, N. J.

TRADE—16mm. Movie Mute sound projector, never out of store, for good scope TV marker generator, etc., or what? Harper Vogue Radio, 16945 Harper, Detroit 24, Mich.

WANTED—Young technician capable of managing service department and doing most of service work shop grossing approx. 18 to 20 thousand per year, well equipped and large stock, 50% working agreement. Write Radio Service, 505 Ivy St., Jacksonville, Fla.

WANTED—Top cash or trade for APR-4 units and parts; microwave test equipment, ARC-1, ARC-3, ART-13, etc.; TS-34 and other TS; General Radio, L&N, Boonton, Ferris, etc. items; manuals, tubes, meters and parts. Have TV and ham equipment—SX-28, scopes, VTVM, etc. Littell, Farhills Box 26, Dayton 9, Ohio.

FOR SALE—Admiral radio-phono comb. console, walnut; 14" Fada TV console, mahogany; both exc. cond. Asking price $300 both. Margaret C. Lewis, 1905 Westmont Ave., Pittsburgh 10, Pa.

WANTED—TV serviceman; 2 stores, service area pop. 200,000. Living costs average. Top wages or percentage. Must take complete charge of service dept. Prefer exp. Crosley man. Write and send picture. Allen's Stores, Grand Haven, Mich.

WANTED—Schematics and information on Western Electric marine phone. Rec. type 12 D., transmitter type 13A., freq. range 2000 Kc to 7000 Kc. The Abell Distributing Co., 5 E. Biddle St., Baltimore 2, Md.

SELL OR TRADE—Turner 34X mike in good cond. with desk stand; 12pc Dietzgen drafting set like new. Want good tube tester, cash or what have you? E. W. Nadolny, 449 Koons Ave., Buffalo 11, N.Y.

FOR SALE—150 Kc 34Mc RF; Handitester DC-AC to 5000 V model M-1 assembled, $13.50. Will trade for good scope or VTVM. H. Cooling, 306 Grant Pk. Pl. SE, Atlanta, Ga.

WANTED—Simpson Rotor-Ranger AC-DC multitester model 221. Will trade Zenith FM radio, model 7H918 and cash, or what do you want? Chas. T. Busby, 1225 Safford Ave., Fresno 5, Calif.

WANTED—Cameras, enlargers, exposure meters and photo equipment. Have radios, parts, meters, test equipment. Let us know what you have and what you want. Hoffman Messenger Service, 2658 N. Wilton Ave., Chicago 14, Ill.

FOR SALE—Motorola "Golden Voice" auto radio, some tubes missing, no speaker, $15; Weston 770 tube tester, $15; Garrard RC-60 Intermix record changer, $25; extra cartridge, $2.50; cabinet, cost $25, sell $15. Walt's Radio, 383 N. Grove St., E. Orange, N. J.

FOR SALE—Stancor chokes C1413 filter 8 Hy. at 300 ma., $4.50; C1720, $4.50; Aircraft dual type remote reading liquid level indicators, $9. Robert Garbarini, 42-12 68 St., Woodside, N. Y.

SELL OR TRADE—Mod XFRM (600 W audio), 2 354's, 2 204A's, 4 500 Mil chokes; Colt .45 and Luger pistols. Would like Meissner sig. shifter Ex, Electric beamrotor, VTVM. Dick Shannon, 74 Minnesota, Buffalo, N. Y.

FOR SALE—10 RCA coin radios, perf. cond. metal cabinets with chrome trim; play 2 hours for 25c. Paid $75 ea.; best offer over $35 ea. takes them. Consider swap. S. G. Cilia, 321 Olive St., Kans. City, Mo.

FOR SALE—Meissner analyst, $50; Precision volt-ohm milliammeter, A-1 cond.; ammeter needs new batteries; price $20; cost $35 new. Roth B. Rose, Box 909, Buena Vista, Va.

WANTED—FM Pilotuner. State price and cond. A. Hochheimer, 446 Willow Ave., Scotch Plains, N. J.

FOR SALE—Precision 10-12 tube tester and E200C sig. gen., RCA voltohmyst Jr; VTVM, Sprague Telomike, Heathkit battery eliminator, all used very little; parts, books and tubes. Best offer takes any one or all. B. J. Urbany, 1302 N. Milwaukee, Iron Mountain, Mich.

WANTED—AM tuner. Give price and tubes. Vernon Blaine, Gary, S. Dak.

FOR SALE—Sylvania no. 131 3" scope; exc. cond., used only a few times. First $50 or trade on Rider's Chanalyst. Shaver's Radio Clinic, Box 124, Templeton, Calif.

SWAP—Custom built, folding, camp trailer in exc. cond., sleeps 4, for $500 worth of radio and TV test equipment and manuals. Also have a few antique tubes to swap. F. G. Wadsworth, 1528 N. Frankfort, Tulsa 6, Okla.

WANTED—Rider's vols. 15 to the present. State cond. and price. Edwin A. Gruneich, Buffalo, N. Dak.

FOR SALE — Rider's Manuals vols. 1-5 abridged, 6-12, and 14, like new, $75. You pay freight. Ralph E. Whitaker, 1121 Baltimore St., Mobile, Ala.

FOR SALE—Underwood typewriter recently recond.; anything over $45. Have several tubes, power transformers, and filter chokes; RCA TV tuner and Sarkes Tarzain TV tuner. Make cash offer. Salvatore J. Lo Nigro, 52 Willowdale Ave., Montclair, N. J.

SALE OR TRADE—GE oscilloscope type CRO-5A; Majestic comb. wire recorder, phono-radio; RCA amplifier. Want late model large tube TV or make offer. G. E. Abercrombie, 605 W. Main St., Clarksville, Tex.

SALE OR TRADE—Weston Electric hearing aid, cost $170 new; Carter Motor Co. converter—6 v DC to 110 V, guar. perf. Need scope, recorder, amplifier or? S. D. Denny, Meadow Rd., Draper, N. C.

SWAP—German automatic, .25 cal. (6.35 mm);uses US ammo. Want sig. gen, AM and FM, or other basic test eqpt. Give all particulars in first letter. R. D. Rosenkrans, c/o Iowa Public Service Co., Sioux City, Iowa.

FOR SALE—Heathkit TV sweep gen. model TS-2. Completely assembled and calibrated, $35. Ray K. Grim, 4107 Bremner Blvd., Richmond, Va.

FOR SALE — Webster Recorder-changer $15; oscilloscope kit $40; Vomax $30; Dumont inputuner, like new $15; video, audio IF and detector strip, like new $20; Electronics 43 to 51 $8. J. Bourke, 127 Great East Neck Rd., Babylon, N. Y.

FOR SALE—Instrument test service equipment; Rider manuals; assorted tubes—list on request; 10 meter phone and CW transmitter panel job and movable National NC-57M rec. Mrs. Joseph Preis, 256 Glenwood Dr., New Orleans, La.

FOR SALE—Meissner analyst, model 10-1154; Heathkit oscilloscope model 03; Vomax VT meter, model 900; solar cond. tester, model 1-60. Arthur Sheets, 1924 W. High St., Springfield, Ohio.

FOR SALE—BC 221 freq. meter with voltage regulated power supply, speaker for check point beats, RC oscillator for modulation and RF amplifier built into unit, $50. Hans Pedersen, 11 Lillian St. Fords, N. J.

FOR SALE—HRO-7 comm. rec., complete, power supply, speaker, 4 coils, 30-1.7MC bands. Used few hours; price $225. Louis P. Ciancio, 5153 Dearborn Street, Pittsburgh 24, Pa.

FOR SALE—Hallicrafter SX43 rec. and R42 speaker, perf. cond., $125. John A. Kimm, 934 Judson St., Evansville 13, Ind.

FOR SALE—BC-221-T freq. meter, $65. Heathkit sig. gen. with calibrated Nat'l dial, $20; Heathkit sweep gen., needs calibration, $25; EICO scope, $35. E. F. Dertinger, 111 Greenridge Rd., Baltimore 4, Md.

FOR SALE—Alliance tenna rotor, $15; all channel booster, $8. First cert. check or money order. Shipped post paid. R. Hargreaves, 9 Kuna Terrace, Irvington 11, N. J.

FOR SALE—SCR 522 transmitter converted for amateur use. Complete with power supply in std. 19" metal cabinet. Photo on request. Best offer. John Newman, 48 Frothingham St., Milton 87, Mass.

FOR SALE OR SWAP—Brush sound mirror, Hammarlund HQ 120; **Hallicrafter SX28A,** E200 sig. gen., RCA vari. audio oscillator; Dumont 208 scope; GE 910 TV; FM, broadcast and SW bands, T. F. Waters, 140 W. Gilpin Ave., Norfolk, Va.

FOR SALE—Service, 20 years; Radio Service Dealer, 1944-1951; Tele-Tech, 1949-1951; TV-Eng, 1950-51; Emerson Service Man., 1-5; Crosley Serv. Man, 1932-6; Stromberg-Carlson Man. No. 1; Supreme Man. No. 1; whole works, $16. Philip Ross, 2420 Sedgwick Ave., NYC 68, N.Y.

FOR SALE—GE TC-3 tube tester; in exchange or will buy Hickok mod. 955 meter (AC-DC-ohms scale). Wm. P. Henninger, 27 N. Market St., Elizabethville, Pa.

SWAP OR SELL—VM 4 speed auto. record changer, with amplifier and speaker. Have testing equipment and many other useful items. Send for free list. Want ½ or ¼ hp 110 volt AC motors. J. C. Ray, 938 Hanson Ave., Norfolk, Va.

SALE OR TRADE—Hallicrafters SX-71 with matching R-42 speaker. Want Radiocraftsman AM-FM tuner model RC-10 and same make, model RC-2 amplifier. Leland Eyres, 314 3rd Ave. S.E., Le Mars, Iowa.

FOR SALE OR TRADE—Eastman Advance enlarger, f-11 lens; Marlin, .22 cal., bolt action repeater with Weaver scope and 400 rounds. $30 ea. or trade for tube checker, test gear. Robert Lohr, 510 S. Cushing, Olympia, Wash.

FOR SALE—NRI professional RC tester, model 112, like new, $25. Charles Godleski, 1101 Mathews Ave., Utica, N. Y.

WANTED—1.5-3 mcs. rec. and one 30-40 mcs. rec. State price, cond., etc. in first letter. R. L. Evans, Jr., Box 156, Ambler, Pa.

FOR SALE—Photographic equipment, radio and TV test equipment, misc. radio and TV text books, exc. cond. Paul Eldridge, 14425 S. Normal Avenue, Chicago 27, Ill.

FOR SALE—Model 900 Vomax, $30; variable and filter condensers, also a few Triplett meters. Please drop card for list. Harold Geise, 3308 84th St., Jackson Heights 72, N. Y.

FOR SALE—Signal tracer, perf. cond., Feiler TS 2, $15 or trade for what have you? George S. Garrigan, 724 Suburban Rd., Union, N. J.

FOR SALE—Heath VTVM, model V4A, $23.50; Heath scope, model G-5, $35; Heath sig. gen., model G-1, $15. Philip Maggio, 718 Eagle St., Utica, N. Y.

WANTED—Rider Man. No. 17 to date; Have for trade 100 radio tubes; old Gernsback's Publications, radio catalogs, Henty Books. G. N. Hartwell, 38 Charlemon St., Newton Highlands, Mass.

FOR SALE OR TRADE — NRI Comm. Course. Will take testing equipment, ham gear, etc. Bob and Mary Bair, R 1, Box 1089, Hood River, Ore.

WANTED—Oscilloscope, mutual conductance tube tester, variable audio oscillator, AC and DC VTVM, distortion analyzer, wave analyzer, square wave gen., impedance bridge, etc. State price, make, model and cond. Deffenbaugh, c/o 151 W. Clinton Ave., Bergenfield, N. J.

WANTED—Set of Rider Man.; AM-FM tuner, good amplifier. Buy or trade Rider Chanalyst, exc. '41 Buick radio. L. H. McKinnon, 1676 Overton Park Ave., Memphis 12, Tenn.

WANTED—Urgant, Guthman U-50 Comm. rec., or Meissner tuning units 13-7616 or 13-7614. Robert L. Patterson, 104 Carlton Ave., Brooklyn 1, N. Y.

FOR SALE—Motorola M45C auto. 45 RPM record player, $8; View Master projector with 6 reels, $8. Stanley Strangle, Trout Creek, Box 6, Mich.

FOR SALE—Rider Man. 1-5, abr. and vol. 6; Radio Electronics from Dec. '46 to Jan. '49; N.R.I. Radio & Tv Course in embossed binders, also other N. R. I. books; all in perf. cond. Make offer. Nelson Morris, 8-36 Chester St., Fair Lawn, N. J.

SWAP—.38 Smith & Wesson and box cart. for Precision E-200-C sig. gen. or model 612-P tube checker. B. M. Russell, 328 E. 180th St., New York 57, N. Y.

FOR SALE—Rider Man. vol. 1-6, 16-18, $55. SCR 211 freq. meter, $35; Speed Graphic with flash and case, $125. Alva Radio Lab., 712 Santa Fe St., Alva, Okla.

FOR SALE OR TRADE—Model VI Crosley 2 tube battery radio; best offer takes it. 1 Radio's Master. Phillip C. Haley Radio Service, Box 21, Dunkirk, Ind.

FOR SALE OR TRADE—Heathkit model 06 scope, never used; cash or trade for NRI sig. tracer model 34. A. M. Bryan, Box 557, Gainesville, Fla.

FOR SALE—Isolation transformer 40 watts. 2¼ x 2 5/8 x 3 1/8 high, shielded. Primary 115 v. 60 cy., secondary 115 v. with 6.3 v. tap. Price $2.45 ea. plus postage. Louis Pressman, 409 Ave. L, Bklyn. 30, N. Y.

FOR SALE—Small 6 volt storage batteries 3½" long, 2" wide, 2" high; packed dry, electrolyte separate. Complete $2.95 ea. Berman Distributing Co., 1188 Broadway, Brooklyn 21, N. Y.

WANTED—McMurdo Silver model 701 radio transmitter. H. C. Barker, RFD 329, Foxboro, Mass.

FOR SALE OR TRADE—Brush PL-25 pickup, sapphire needle; Pickering S140S cartridge with .001 stylus. Only used about 3 hours. Robert Kennedy, 5169 Maple Ave., St. Louis, Mo.

WANTED—304th or 304tl tubes, 2 good filaments, but will settle for 1 good filament if tube is not gassy. Joel L. Ekstrom, Georges Hill, Southbury, Conn.

FOR SALE OR TRADE—5BP1; 7JP4, like new; 7" Telekit, with cabinet. Want oscilloscope, pocket size. M. Revzin, 134 E. Mosholu Pkwy., Bronx 58, N. Y.

WANTED—Hallicrafter aircraft radios models CA-2, CA-2A, CA-4. Write condition and price. William T. Neat, 511 W. Canedy St., Springfield, Ill.

FOR SALE—17" nat'l adv. brand table model TV sets, dark picture tube at dealer price, unopened. Overstocked. Sheboygan Radio, 1210 N. 8th, Sheboygan, Wis.

WANTED—2 KW 110 V 60 cy gen. or gas powered plant; 16 mm sound movie recorder. Penn Electronics Co., Box 65, Elizabethville, Pa.

WANTED—Books on radio, TV, electronics, chemistry and photography. Correspondence courses on all subjects. State lowest prices. John Skane, Halifax 1, Pa.

FOR SALE—Rider Man. 1-12; very good cond., $100. O. F. Hamm, 4751 Louisiana Ave., St. Louis 11, Mo.

FOR SALE OR TRADE—Sam's Photofacts; Precision tubetester, 6 volt bench supply; oscilloscope and other radio supplies. Want cash, shotgun, pistols, or factory built amplifier, over 15 W. Barney Loebe, Grenada, Miss.

FOR SALE—Model 56X10 RCA table radio, 6 tubes, AM SW, $13.95; many hard to get tubes. No COD's. Jones Radio Co., Box 93, Douglassville, Pa.

TRADE—Radio-TV course (Nat'l Schools); Radio Amateurs Guide 1942; Serv. by means of resistance meas.; Serv. Superheterodynes, Everybody's Radio Man., Elements of Radio Mech,, Radio troubleshooters handbook; all for good jig or table saw. Selcraft, Box 394, Spring Valley, N. Y.

FOR SALE—N. R. I. Radio-TV Course, $21 postpaid. Gerald Spector, RD 2, Box 78, Lakewood, N. J.

WANT—National NC100 Comm. rec. A. W. Nevers, 402 S. Main St., Mt. Pleasant, Iowa.

FOR SALE OR TRADE—Have enormous supply of electronic devices and associated components. Want to communicate with experimenters in the ultrasonic field. Ben Boles, 407 S. Kilbourn Ave., Chicago 24, Ill.

WANTED—Hallicrafter or National rec. Have Remington mod. 16 typewriter in perf. cond. to swap. Ben Leerman, 2846 Oaklay Ave., Baltimore 15, Md.

FOR SALE OR TRADE—GE short wave 6 band portable, with battery; 6 tube amplifier. Want household tools, short wave kits, outdoor TV antenna and rotor or what have you. State make, all letters answered. George Pollack, 8742 S. Beck Pl., Oak Lawn 9, Ill.

FOR SALE—Precision E-200 sig. gen. with instructions, $25; NRI Radio course (less kits), $15. Alfred A. Johnson, 5604 N. Western Ave., Chicago 45, Ill.

FOR SALE OR TRADE—TBS-50 transmitter, Harvey Wells, 500 V., 275 MA power supply available extra; carbon mike and 10 meter crystal also inc. Best price takes it. Fred L. High, 1116 Wabash Ave., Danville, Ill.

FOR SALE—General Industries R90L 2-speed disc recorder, $22.50 fob; Garod Camera-style portable radio, $15 fob. Hein Radio Service, 418 Gregory St., Rockford, Ill.

FOR SALE—Used radios, speakers and other parts. Local dealer preferred. Len Sporn, 74 Belmont Ave., Paterson 2, N. J.

FOR SALE—National NC-240 rec. Very reasonable, if called for. H. Latko, 1922 Dickens, Chicago, Ill.

FOR SALE—Stancor 30M mobile transmitter with Carter dynamotor; runs 32 watts on 10 meters; $60. A. F. Baczuk, 916 E. 73 St., Cleveland, Ohio.

WANTED—Salesman with 7 years. experience as radio repairman wants job with chance to get some TV experience. Will go anywhere. James E. Watson, 1104 Goldilock St., Rt. 1, Madison, Tenn.

WANTED—Meissner band spread front end tuner or reas. priced ham rec. that need not be working so long as it has crystal filter. M. Gurlin, 111 White Horse Pike, Audubon 6, N. J.

SWAP—Radio and electrical books and magazines; a few radio tubes, NRI Radio course, and other items. Want wood working books and magazines, stamps, hobby books, etc. Burbage H. Buchanan, Hawk, N. C.

WANTED—SCR522 xmitters and rec. Preferably unconverted; Weston model 301 D.B. meter; Command rec., etc. Robert Hayos, 209 W. 104th, New York 25, N. Y.

FOR SALE OR TRADE—RCA 8TS30 cabinet (only) in exc. cond: 7JP4 picture tube; make offer. Sam Small, 1043 Manor Ave., Bronx, N. Y.

FOR SALE—Absolute high fidelity amplifier by Amplifier Corp. of America; model ACA 100GE, direct coupled. Jack Brown, 1631 Walton Ave., NYC 52, N.Y.

WANTED—Superior CA-11 VTVM. Write your best price. Give full particulars. J. E. McManus, Thornton, Ark.

FOR SALE—NC 101X in good cond., $50 with speaker. Thomas Putalik, 3141 Sedgwick Ave., Bronx 63, N. Y.

FOR SALE—Gardiner electric code sender complete with 10 tapes. $15 or will trade for cond. tester in good cond. George W. Crist, Litchfield, Mich.

TRADE—Rider Vols. 1-3; will exchange for later volumes. Harry Nickerson, 201 Devonshire St., Boston, Mass.

FOR SALE—Rider Man., 1-15 inc., complete with indexes, exc. cond.; fob Miami $125. William P. Meany, 11380 Biscayne Blvd., Miami 1, Fla.

FOR SALE—Heathkit TV sig. gen. and oscilloscope. Completely wired and in exc. cond. Irwin Karabush, 4913½ W. Quincy St., Chicago 44, Ill.

FOR SALE—TG-10C automatic keyer with spare parts and 2 complete heavy metal cabinets for same; 1-3 tube amplifier; tubes; Burgess Vibratool; Argus 35mm. camera, model A; 2 DC dynamotors. For sale or what have you? John O. Hehn, 18 S. Jardin, Shenandoah, Pa.

FOR SALE—Telesweep sweep gen. in exc. cond.; $50 or best offer; 2-BC645, 450 Mc rec. and xmitter complete with tubes; best offer. Edward Tanrath, 2631 S. Drake, Chicago 23, Ill.

FOR SALE—Complete SCR284 xmitter-rec. PE103-PE104, antenna, etc., also spares; good cond.; BC733D like new. Wallace Radio Service, Box 42, Olancha, Calif.

FOR SALE—Meissner Analyst, $60; McMurdo Silver Sweep sig. gen. 2-226 Mc., $25; Heathkit 5" scope, $25; all good cond. with instructions. Want typewriter. John A. Schwerbel, 166 36th St., Lindenhurst, N. Y.

FOR SALE—Hickok tube and set tester, model 534, never used. First $125 takes it. Ted Solarz, 3033 S. Pulaski Rd., Chicago 23, Ill.

FOR SALE—Lettine model 240 transmitter, coils for 80, 20 and 10 meters, like new; price $50. H. L. Evertson, 1035 Wilder St., Helena, Mont.

WANTED—25B8 tube. Harris Radio Service, 3525 S. Wash. St., Vicksburg, Miss.

FOR SALE—Custom made Hi-Fidel. sound system complete with phono., amplifier, speakers, mikes, etc.; complete microscope outfit with slides and other additional equipment. Roger Many, 1029 Minor Ave., Hamilton, Ohio.

FOR SALE—Rider Man. vols. 1 and 6 thru 19; vols. 1 and 2 in TV; all practically new; 17 vols. in all for $170. Act immediately. Irving Solomon, 159D Hendrix Dr., Brooklyn 7, N. Y.

WANTED—Splatter suppressor choke Thordarson type T15C31 or similar type. R.E. Schlosser, 503 Fifth St., Defiance, Ohio.

FOR SALE—6-tube Temple portable with battery and cord for 110 line, 1948 mod. $30. Want old, clean 3c gov. stamped envelopes. Ben W. Mueller, N. Tonawanda 2, N. Y.

FOR SALE—Auto radios for every car. Square Deal Stores, 268 E. 149 St., Bronx, N. Y.

FOR SALE OR TRADE—Presto recording turn table model 75A, 78, and 33 1/3 speeds; complete with Presto cutter No. 1-C and Audax play back head. Make offer; Webster model 79 wire recorder base. Marvin H. Davidson, 8606 Wilshire Blvd., Beverly Hills, Calif.

WANTED—Waterman Pocketscope, model S-11-A 3" oscilloscope in perf cond. Will pay cash or trade for same. L. E. Klingberg, Jr., 3535 W. 109 St., Inglewood, Calif.

FOR SALE—Hallicrafters SX-25 in working order; price $35 fob. W. Richman, 3438 90th St., Jackson Hts., L. I., N. Y.

FOR SALE—Superior model 400 multimeter, needs repairs.; best offer takes it. Stephen Barniak, 2426 Perot St., Phila. 30, Pa.

WANTED—PM speakers, any cond., any size, any shape; steel shelving and radiators; state price and quantity. Have test eqpt., tools, radios, TV. Troch's, Spotswood, N. J.

FOR SALE—(3) Precision model EV 10 VTVM megohmeters in walnut hardwood case, $49.50; reg. $90.85 while they last. Carrs Television Center, 15-17 Kelley Sq., Worcester 4, Mass.

FOR SALE—Portable "Portomatic" radiophonograph; AC-DC radio, short-wave; record-changer, 10" and 12". Best offer plus delivery. NYC delivery free. C. Grande, 16 Moylan Pl., N. Y. 27, N.Y.

WANTED—6 volt battery eliminator. State price and cond. Greiner Radio Service Co., 299 S. Elmwood Ave., Buffalo, N. Y.

SWAP—Old type tubes for new type at reduced prices. For sale—12J5GT, 50c; 6SK7GT, 80c; 70L7GT, $1; 19, $1.50; 30, $1; 1A5GT, 75c; 5Z3, 80c; all like new. Ben's radio, N. Tonawanda 2, N. Y.

FOR SALE—What offered for National Schools Radio-TV Course complete—no equipment. Best offer gets same. Seligson, New City, Rockland Co., N. Y.

FOR SALE—Hallicrafter 610-E transmitter, exc. cond, $700. George J. Ikelman, 5513 Brite Dr., Bethesda 14, Md.

WANTED—Rider Man. vols. 13 and 14. State cond. and price. C. R. Thompson, 709 Jackson St., Pueblo, Colo.

FOR SALE—RCA 162-C Rider Chanalyst, $75; Triplett tube tester model 2413, $30; 666H Triplett meter, $15; BC221Q freq. meter, $85. Drury R. McCurdy, Box 547, Central Valley, Calif.

FOR SALE—Sams Fotofacts, sets 1-25 complete. What am I offered? J. P. Alden, 2401 Ulrich Ave., Dayton 6, Ohio.

FOR SALE—Motorola car radio, deluxe model CT9, good cond., for 1949 or '50 Chevrolet, $45 or what have you in amateur eqpt.? Bert Rex, Jr., Lehighton, Pa.

WANTED—Meissner FM tuner, exc. cond., $22; will pay shipping. Have coin collection for local buyer. S. Swetzoff, 149 Intervale St., Boston 21, Mass.

WANTED—Enclosed relay rack 60" or more in height; H.U. plate transformer 2000-2500 at 500 mills out of rectifier. H. Decker, 1858 Rural Ave., Huntington, W. Va.

SWAP—200 rec. tubes; home built 8 W. musical amplifier; Rider Man. 1-5, thru 17; Midwest 18 tube rec., needs speaker no cabinet; swap for VFO, sig. gen., pistol, crystals, or what? R. T. Whitaker, Bishop, Tex.

WANTED—National type N dial. T. Chinalski, Fennville, Mich.

WANTED—Two TV technicians. Southern Radio and TV Repair, Lumberton, N. C.

FOR SALE OR TRADE—Complete 75 meter mobile rig; BC-654-A; PE-103; T-17 mike; Premax antenna and mount; speaker; cables, $75 cash or will trade for 300 watt tetrode final. William P. Schubeck, 40 Maple Avenue, Franklinville, N. Y.

SELL OR TRADE—16mm. sound projector; Simpson voltmeter; automatic changer; TV set. Want HRO SX-28. Fred Simonian, 16D Ellis St., Lynn, Mass.

WANTED—25 watt mobile sound system, with or without accessories. Give full particulars and price. Hartmann 63-04 B'way Woodside 77, New York.

FOR SALE—Rider Man. 1-16, exc. cond., $99; Jackson 645 V.T. Multimeter and Jackson 640 sig. gen. $28 ea.; Wireway wire recorder $75; Meissner portable disc recorder $80. Burgeson Radio Service, 1221 Franklin, Shelton, Wash.

TRADE—Turntable for Wilcox Gay Recordio Mod. 6B10; Remington Rand Dexigraph photostat machine; automatic timer, daylight operation. Want wire recorder, three speed turntable, test equipment. Jay M. Washauer, 335 Richland Ave., Baton Rouge, La.

WANTED—one ECO for 80 meters for HT6 transmitter, one for 20 meters and one for 10 meters. Advise price and band available. Cpl. M. Makarchuk, Fort Osborne Bks., Winnipeg, Man., Canada.

SWAP OR SELL—Meissner dual speed recorder phono radio and amplifier. Two channel input, exc. repro., recording level indicator, mike inc. Sell for 80 or comm. rec. Thomas Korn, 4412 Milwaukee Ave., Chicago 30, Ill.

WANTED—Dynamic mutual conductance tube tester. State make, mod., cond., price. Aaron D. Brooks, 209 W. Collins, Midland, Mich.

SELL OR TRADE—Firestone 3½ hp outboard; NRI sig. gen.; NRI VTVM 20,000 O.P.V.; 22X telescope; 3 tube amp. Want Eico scope, VTVM or what have you? Karl Nester, Box 76, Van Meter, Pa.

SELL OR SWAP—810, 813 transformers, cond., meters, chokes, etc. Want complete mobile eqpt. What do you have" R. V. Rosellini, 2619 S. Gaylord, Denver, Colo.

FOR SALE—Resistors, speakers, switches, jacks. 40% discounts. Send 10c for list to cover postage and printing. Messenger Radio Workshop, 81 Mechanic S., Foxboro, Mass.

FOR SALE—Rider Man. 1-17, No. 1 TV Man $90; Hickok 5" scope mod. 505 $90; Heath 5" scope, mod. 05 $20; Jackson mod. 640 test oscillator $35; Rider Chanalyst $50; Eico TV sweep gen., VTVM, ea. $25. Ralph Ayres, 126 Rosemont Dr., Syracuse, N. Y.

WANTED—Operating man. for the NC101X rec. Ed Healy, 1349 Union St., Indianapolis, Ind.

WANTED—Panadaptor, good cond.; have brute force line filter plus low pass filter. Will trade or pay cash for Panadaptor. J. A. Meade, 2937 Far Rockaway Blvd., Far Rockaway, N. Y.

FOR SALE—Eico sweep gen., mod. 360K, like new $35; RCP Dynoptimum tube tester, mod. 322A $30; 12GP7 CRT $10; TV enlarger lens $5; 2 tube SW rec $9. M. Konon, 244 Irving Ave., Brooklyn 37, N.Y.

TRADE—33 1/3 RPM record player, like new; GE 3-speed new heating pad; 4 new meters, DC and RF by GE and Westinghouse. Want tubes and 410 double shotgun. Frank Popma, Orange City, Iowa.

WANTED—Geiger counter and mineral and metal locator. Have tube checker and electronic multitester, tools, and automatic pistol. Will trade. Holdmans Radio Shop, 204 Jackson St., Bonne Terre, Mo.

WANTED—Power supply, appr. 28 V. DC output at 10 amp.; 110 V. single phase AC input. K. K. Miller, 81 Shennecossett Pkwy., Groton, Conn.

FOR SALE—BC-348-O rec.; D-104 mike and desk stand; 250 MA 600 V. P.S. wavemeter, monitone, BUG, 20 W. xmitter, and many more parts; nothing separate $65. Charles Salzinger, 229 E. Drinker St., Dunmore, Pa.

WANTED—Rider Man. 17 to date. Swap back numbers radio magazines and catalogs 1920 to 1943, antique radios, and books. G. N. Hartwell, 38 Charlemont St., Newton Highlands, Mass.

SELL OR SWAP—Demodulators, remote control system M-2, comp. with trans. and Selenium rectifier, $2 or 3 for $5. Want meters or tubes. P. W. Kilpatrick, 1030 Curtis St., Albany 6, Calif.

FOR SALE—Wire recorder basic unit, less amp., "St. Charles mod. GE-9A," inc. oscillator coil and 2 1-hr. spools of wire $25. fob Rockford. W. R. Batten, 1536 Crosby St., Rockford, Ill.

FOR SALE—UTC high-fidelity trans., type LS-61 $16; National PW-4 precision 4-gang capacitor with micrometer dial, 222 uuf/section $16; both like new. O. L. Updike, 1848 Winston Rd., Charlottesville, Va.

WANTED—Scott or McMurdo Silver Broadcast rec. or amp. chassis, any year. Best cash price, or swap test gear. S. A. Cisler, 811 B St., San Mateo, Calif.

WANTED—Cardax No. 950 crystal mike, reasonable. M. G. Wheeler, 1531 Catalpa St., Louisville 11, Ky.

SELL OR TRADE—Rider Man., abr. vol. 1-5, 7, 8, 10-12, 14—$10 ea. or all $60; RCA man.. 1938-'42 $5; Hickok 288x sig. gen. $49.50; Philco scope, 2", mod. 7019 $20. Want tape recorder. Walter Keith Radio, 900 N. 7th Ave. W, Newton, Ia.

FOR SALE—80 meter ARC-5 xmitter and rec. with reg. power supply, meter, phones, key, monitor, etc., all $35; 7" Transvision TV with cabinet; make offer; BC-223-AX $12. Wm. D. Glenn, 3541 Nottingham Way, Hamilton Square, N. J.

FOR SALE—Heathkit TV align. gen., mod. TS-1A, with blanking cables inc., used about 15 hrs. Best offer over $35. F. M. Watson, 119 Hillcrest Ave., Collingswood 7, N. J.

TRADE—De Forest's Radio Course, 2 meters, basic sig. gen. kit, and tube testers, for a good centerfire rifle, or revolver. Carl Moore Jr., 432 Lookout St., Warren, Pa.

WANTED—6 V. DC dynamotor, new or used, good cond., with minimum output voltage of 375 V. DC at 150 Ma. A. J. Haladay, 262 Pringle St., Kingston, Pa.

FOR SALE—ATR rectifier pow supply type 120C, mod. EL10, ser. no. 10461659, input 115 V. AC 50-60 cy., output 6.3 V-14 A., or 14 V.-7 A.; very good cond. $25 fob. Pgh. Veto M. Twaska, 3105 Bergman St., Pittsburgh 4, Pa.

FOR SALE—Silvertone mod. 823-1, 3-way portable radio with new type "Ferri-Loopstick" antenna, exc. cond. $17. William Hintz, Rt. 4, Hutchinson, Minn.

FOR SALE—BK 403 Brush tape recorder, 2 speed, exc. cond. $175; 5" speaker and baffle $5; LP arm, like new, $2.50; PL20 Brush 16" pickup, like new $8. Want Sperti Handi walkie-talkies; RCA 44BX mike, mike boom. John Nowak, 33 Parker Ave., Passaic, N. J.

FOR SALE—Vibroplex "Bug" and case $12; 110 V oscillator for same $10; Brush lapel mike, like new $9; Casco Elec. Handi-Tool Set $12; Hanovia sun lamp $25. Marvin Shapiro, 1240 Sherman Ave., Bronx 56, N. Y.

SWAP—10 W amp.; 12" speaker in baffle; Turner Dynamic mike; 6-tube portable; Triplett 1175A tester; Solar mod. C.E. ExamEter, incorporates VTVM; G.I. record changer. Want power tools; prefer Shopsmith. Ralph F. Johnson, Greenlee, Va.

WANTED—35mm camera in good cond. Will pay cash or trade Underwood portable typewriter; DeForest Radio Course; nut and candy vending machines. William H. Roesler, Box 26, Lavina, Mont.

FOR SALE—Henney's "Radio Engineering Handbook," 3rd ed., like new; QST from Feb. '49 to Dec. '51 inc., A-1 cond. No swaps, best offer. Raymond H. Ives, 663 Kempsville Rd., Norfolk 2, Va.

FOR SALE—Clough-Brengle sig. gen. mod. OC, Universal speaker mod. 131; cond. tester mod. 130; Precision apparatus tube tester, ser. 700, all in A-1 cond. All for $35; Brooklyn area only. J. J. Mihalovich, 1374-68th St., Brooklyn, N. Y.

TRADE OR SELL—UTC driver and UTC universal 30 W. output trans. equivalent to S-8 and S-16. Need Supreme man. 1-5 or make offer. Lucian A. Spriggs, 155 Wellington Ave., Washington, Pa.

FOR SALE OR SWAP—ATR, inverter 6 V. DC input, 110 V. 60 cy. 75-85 W. AC output, perf. cond.; 2 85-Mfd 450 V. metal can cond., like new; all fob. San Diego. Want Weston or Triplett 2" 0-15 amp AC meter Rd. Fl. bakelite case, in perf. cond. R. C. Wilmarth, 927 9th Ave., San Diego 1, Calif.

FOR SALE—Weston mod. 772 type 2 analyzer; 773 type 1 tube checker; 776 oscillator; Rider Man. 4-10, like new; 300 W. and 100 W. American Beauty soldering iron. Other items. Samuel P. Camp, Rockmart, Ga.

FOR SALE—Heath mod. V4A VTVM and R.F. probe, perf,; Heath mod. 0-7, 5" scope, exc. Arthur Kramer, 340 E. 184 St., New York 58, N. Y.

WANTED—Tape recorder; will pay cash. Give full particulars. Fred Hartmann, 63-04 Broadway, Woodside 77, L. I. N. Y.

FOR SALE—Motorola 65 car radio $5; Arvin car heater $5; RCA MI-2454-B chest-set sound powered phones, pr. $10. David A. Wolfthal, 270 Ft. Washington Ave., New York, N. Y.

SALE OR TRADE—Kenyon heavy duty transf. type C9883, cuts 110 V. to 2.5 V. at 10 amps.; center tapped 1.5 V. at 10 amps. Make offer or what have you. George R. Easton, 2007 Eagle St., Baltimore 23, Md.

FOR SALE—Mod. AFC-20 Sun Radio FM-AM tuner in exc. cond; best cash offer above $75. Daniel B. Lane, East Beckley, W. Va.

FOR SALE OR TRADE—3 matched dynamic speakers, 10", comp. with matching transformers and baffles; best offer. Want 7" TV or ? Bill Blackwell, St. Francois, Mo.

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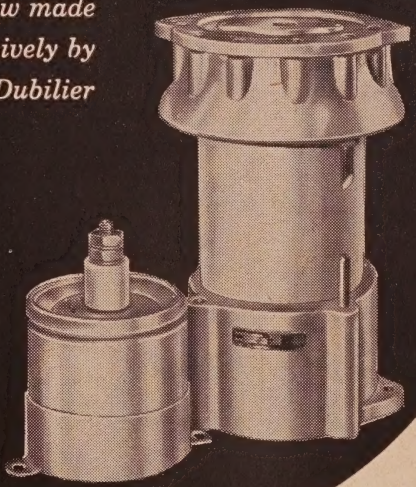

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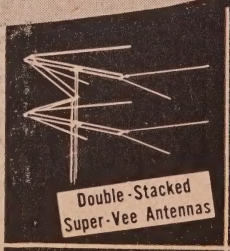

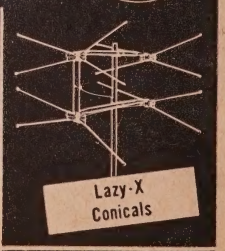

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